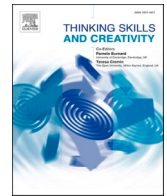




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Skills as declared learning outcomes of entrepreneurship training in higher education institutions across the globe: Classification and analysis with a focus on thinking skills[☆]

Pavel S. Sorokin^{a,*}, Svetlana E. Chernenko^b

^a Head of the Laboratory for Human Capital and Education Research in the Centre for Vocational Education and Skills Development, Institute of Education, National Research University — Higher School of Economics, 16/10, Potapovsky per, Moscow 101000, Russian Federation

^b Specialist in Educational and Methodical Work in the Center for Center for Pedagogical Excellence, Expert in the Laboratory for Human Capital and Education Research in the Centre for Vocational Education and Skills Development, Institute of Education, National Research University — Higher School of Economics, 16/10, Potapovsky per, Moscow 101 000, Russian Federation

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ABSTRACT

The study identifies and classifies skills as declared learning outcomes in entrepreneurship education programs and courses in higher education by looking at globally recognized universities, indexed in authoritative QS ranking and mentioned in literature (43 universities). We analyze descriptions of the declared expected results of entrepreneurship education located on universities' official websites. We take into account both, available documents and general descriptions on the webpages. The method is manual content-analysis.

We find a lack of consistency and high differentiation, including formulations related to thinking skills. We develop the classification of declared outcomes of entrepreneurship education in higher education institutions based on the ideas of human capital theory. This classification considers the role of thinking skills, which remains on periphery of current discussions about learning outcomes of entrepreneurship education.

Abbreviations

HC Human Capital Theory

1. Introduction

This study identifies and classifies the formally declared learning outcomes of entrepreneurship education in universities, with special attention to thinking skills. By thinking skills we imply the set of basic and advanced skills and subskills that govern a person's mental processes (Cotton, 1991). We analyze skills specified in the official content related to bachelor's and master's degree courses and programs in internationally recognized universities. Our sample is based on the QS ranking (QS World University Rankings,

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* Corresponding author. Present/permanent address. Work address 16/10, Potapovsky per., 101 000, Moscow, Russian Federation.

E-mail addresses: psorokin@hse.ru (P.S. Sorokin), schernenko@hse.ru (S.E. Chernenko).

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Business & Management Studies, 2020) and the sample from the esteemed academic monograph – 9 universities (Volkman & Audretsch, 2017).

We do not approach learning outcomes through students' self-assessments or as the results of formal testing, unlike much of the current literature. As shown in previous research, the problem with self-assessments is the risk of subjective interpretations and social desirability factors (Bolívar-Cruz et al., 2015; Campbell et al., 2001; De Grez et al., 2012). The problem of the formal testing is the lack of generally accepted instruments in the international practice to measure the skills relevant to entrepreneurship education (Barbot et al., 2015; Davis et al., 2016; Paulhus, 1991).

Despite increasing attention of international scholarship to entrepreneurship education in higher education institutions, what remains understudied is the institutionalized (formally expected and declared) learning outcomes of such activities. Our goal is to find out what entrepreneurship programs and courses publicly demonstrate or declare as expected learning outcomes (not evaluating the extent to which the related skills are actually developed). Taking into account the obvious differences between the declarative statements and the actual practice, such analysis is important for understanding the level of entrepreneurship education institutionalization in higher education globally. Formally declared learning outcomes shape (at least, to some extent) not only the individual trajectory of a student, but also the institutional dynamics of the educational process as a whole (Mølstad & Karseth, 2016). However, analysis of this question is still lacking in the literature on entrepreneurship education. There are reviews of skills-related issues (Nabi et al., 2017; Rashid, 2019; Tittel & Terzidis, 2020), but they all do not address directly the formal curriculum of entrepreneurship education programs and courses (Chien & Chu, 2018; Duruk et al., 2017; Matthews & Mercer-Mapstone, 2018).

Meanwhile, the analysis of declared learning outcomes institutionalized in the formal curriculum of educational programs is a rapidly developing field of research, both in relation to education in general (Mølstad & Karseth, 2016), and in the particular subject areas (for instance, in engineering education Meda, & Swart (Meda & Swart, 2018), or in medicine education Botelho et al. (2019)). One of limitations of such approach based on websites and/or documents analysis is difficulties in assessing if data on official web-sites is complete or up-to-date.

At the same time, such approach seems relevant to the current state of discussions and research on entrepreneurship education learning outcomes. The existing reviews show no agreement among researchers on what learning outcomes should be central and how they can be classified (Nabi et al., 2017; Tittel & Terzidis, 2020). However, academic discussion so far paid little attention to the actual practice of teaching entrepreneurship in universities, which grows more and more massive and global (Nabi et al., 2017; Tittel & Terzidis, 2020). Our study aims to fill this gap partially. The first possible step in this direction could be to analyze the formulations of expected learning outcomes in the related educational programs and courses. It is the first attempt to identify and classify the skills as expected learning outcomes in the mass international practice of teaching entrepreneurship in universities. Such analysis could inform further research concerning what exactly is meant by the related skills and how these skills are developed and measured as learning outcomes in universities.

We used only English-language versions of university websites. This can be both a limitation and an advantage. All the universities in our sample are listed in the authoritative QS subject-ranking or in an esteemed academic publication (see above). Thus, they represent the internationally recognized practice of teaching business related subjects (including entrepreneurship). So -we can expect that their English websites are relevant and up-to-date. Also, the use of English-language versions of websites allows to identify similar or close formulations of declared outcomes relatively easier (which could be much more difficult in case of using websites in different languages).

The purpose of this study is to identify, analyze and classify skills as declared learning outcomes indicated in the official documentation of entrepreneurship education courses and programs in internationally recognized universities. By "entrepreneurship education" or "training" in higher education we imply only those courses and programs that directly and explicitly relate to entrepreneurship education in the framework of bachelor's and master's degree according to the official information on the university website. The expected learning outcomes are identified on the official webpages of the program or course, including documents, attached to the web-page (in case there are any).

Thinking skills as possible learning outcomes of entrepreneurship education are put in the focus of the research due to their increasingly discussed role in literature on various education fields such as medicine and engineering, which emphasizes their special importance for creating new products and solutions (Ali-Abadi et al., 2020; Narayanan & Adithan, 2015). Though there is no common definition of "thinking skills", we use the approach from Cotton's work "Teaching thinking skills" (Cotton, 1991): thinking skills are defined as the set of basic and advanced skills and subskills that govern a person's mental processes. These skills consist of knowledge, dispositions, and cognitive and metacognitive operations (see Alvino's "Glossary of Thinking-Skills Terms" (Alvino, 1990, p. 50)). We also refer to the notion "entrepreneurial thinking skills" understood as "the ability to identify marketplace opportunities and discover the most appropriate ways and time to capitalize on them" (Grzybowska & Łupicka, 2017).

The classification of skills as learning outcomes of entrepreneurship education in higher education is recognized as a challenge in academic literature (Nabi et al., 2017). One of the limitations of the current discussions is that existing classifications pay little attention to thinking skills despite their possible high relevance to entrepreneurial activities (that existing research suggests (Tittel & Terzidis, 2020)). Another limitation of literature is the gap between debates on entrepreneurship education learning outcomes and the broader discussions on learning outcomes in education policy, including in higher education. Literature on entrepreneurship education learning outcomes uses various frameworks (Bacigalupo et al., 2016; Tittel & Terzidis, 2020), however, it does not refer to the ideas of human capital theory, which remains at the core of the international discussion on education, including learning outcomes (Kuzminov et al., 2019). This is especially surprising since human capital theory provides concept directly relevant to entrepreneurship issues, including entrepreneurship education in higher education. This is the concept of "Entrepreneurial element of human capital" or, in other words, "Allocative Abilities" (Schultz, 1975).

Responding to this gap we use the ideas of the human capital theory (Becker, 1993; Schultz, 1975) to analyze empirically and build a classification of learning outcomes of entrepreneurship education in globally recognized higher education institutions, with a special focus on thinking skills.

Thinking skills as learning outcomes are understood and operationalized as, first, learning outcomes named with the word “thinking” (for instance, critical thinking, analytical thinking, etc.), and, second, formulations of skills, whose naming does not contain the word “thinking”, but the description clearly suggest that skills are a designation of a type of thinking (for instance, “generating ideas”) or its aspect (according to Cotton’s definition cited above (Cotton, 1991) “knowledge, dispositions, and cognitive and meta-cognitive operations”).

We have three hypotheses:

- 1 Thinking skills occupy an important place within declared learning outcomes of entrepreneurship education in global practice in higher education. This hypothesis is based on the recognition of thinking skills as vital for learning in various contexts, which allows to suggest thinking skills to be a valuable component of general human capital (Becker, 1993; Edwards-Schachter et al., 2015).
- 2 There are thinking skills that theoretically might be referred to “entrepreneurial component” of human capital (allocative abilities) as conceptualized by T. Schultz (Schultz, 1975). We expect that, at least, some skills can be attributed (by name and/or context) to the entrepreneurial element of human capital, in particular, related to the creation of a novelty in terms of business-strategy or idea of a project. Linking thinking skills concept with human capital theory allows to better understand not only the first but also the latter, including the possibly overlooked role of thinking skills (Kuzminov et al., 2019).
- 3 There is high differentiation among formulations of skills as declared learning outcomes of entrepreneurship education in global practice in higher education, including thinking skills. The hypothesis derives from academic discussion, which indicates a lack of consensus in academic research (Tittel & Terzidis, 2020) – however, it has not yet been tested on the mass international entrepreneurship teaching practice.

1.1. Theoretical background: looking at skills through the prism of human capital theory

Human Capital Theory is based on the ideas of Schultz and Becker, expressed in the 1950s-70 s, which became the basis for many skills classifications (Kuzminov et al., 2019). The theory of human capital is dominant in the discussion on education development (World Economic Forum, 2018). The theory of human capital may be helpful in understanding entrepreneurship education development in the context of a broader discussions about education, including debates on entrepreneurial element of human capital.

According to the HC theory (Human Capital Theory), the success of a person in adult life depends to a large extent on the match between the acquired skills and the required (desired) position (including the position of an entrepreneur, self-employed, freelancer, etc., not limited to corporate employment). Despite the enriching connotations of human capital, it is surprising that the idea of entrepreneurial skills as a special component of HC is only emerging in recent years (Kuzminov et al., 2019), although it was originally theoretically justified by Schultz in the 1970s (Schultz, 1975). Schultz identified a special type of human capital – “entrepreneurial” (Schultz, 1975), which has universal applicability as “the ability to deal with disequilibrium” or “allocative abilities”. Such qualities are obviously important for entrepreneurship. However, this idea of Theodor Schultz has not been introduced to mass empirical studies or the mainstream practice of educational policy including initiatives on entrepreneurship education (Kuzminov et al., 2019).

One more conceptual contribution of HC theory is the well-known distinction between general and specific skills (Becker, 1993). According to definition, specific skills operate only at a specific workplace, while general skills are useful in broad spectrum of positions on the labor market (Becker, 1993). Later, the understanding of specific human capital expanded to include skills that are specific to certain industries (Kuzminov et al., 2019).

1.2. Literature review: entrepreneurship education and its outcomes in universities

Entrepreneurship education in universities is a rapidly growing field of practice and research (Sandström et al., 2018; Valerio et al., 2014; Von Graevenitz et al., 2010). By 2020, almost half of Scopus-indexed articles on entrepreneurship education was published from 2016 to 2019 (Sorokin et al., 2020). The growth of academic research and interest in entrepreneurship may be associated with the decline of formal corporate sector of employment and increasing cultural legitimation of building your own new business (Sorokin & Froumin, 2020). At the same time, discussions about entrepreneurship education evolve separately from the broader debates on education policy including the increasing demand for skills related to entrepreneurial behavior broadly understood. This may hinder the development on entrepreneurship education practice and research.

Today, one of the main problems in research and practice in entrepreneurial education is the lack of consensus on skills as formally declared and intended learning outcomes (Nabi et al., 2017). There is no agreement on skills lists, which indicates the need for reflection about the accumulated global experience (Nabi et al., 2017). An important limitation of the current academic discourse on entrepreneurship education in universities is the lack of empirical analysis of educational practice, which leads to an increasing lag between research and practice (Nabi et al., 2017; Volkmann & Audretsch, 2017).

A World Bank report from 2014 indicates that skills are a priority for the development and research on entrepreneurship courses (Valerio et al., 2014). It is generally accepted that skills are necessary to take advantage of emerging entrepreneurial opportunities (Nichter & Goldmark, 2009). On the other hand, increasingly unpopular in the literature is the claim that entrepreneurship cannot be

taught, and the related abilities are completely determined by genotype or other innate factors (Kautz et al., 2014).

Despite active discussions concerning skills, the thinking skills are not in the center of mainstream literature on entrepreneurship education. For instance, in the recent comprehensive review of skills by Tittel and Terzidis (Tittel & Terzidis, 2020) only 3 (out of 57) thinking skills are presented: analytical competence, idea generation, logical thinking. The same applies to the earlier review by Mitchelmore and Rowley (Mitchelmore & Rowley, 2010), where the same 3 skills are highlighted. Other reviews also give limited attention to thinking skills (Hofer & Potter, 2010; Mitchelmore & Rowley, 2010; Nabi et al., 2017; Rashid, 2019).

At the same time, the importance of thinking skills for an entrepreneur is highlighted in existing research, which looks at the actual practice of entrepreneurship. For instance, Hatthakijphong & Ting (2019) emphasize critical and creative thinking. Edwards-Schachter et al. (2015) examine the importance of creativity skills.

There are a lot of review articles that consider skills as the main outcomes of entrepreneurship education with a particular focus on universities (Hofer & Potter, 2010; Mitchelmore & Rowley, 2010; Nabi et al., 2017; Tittel & Terzidis, 2020). However, these papers do not analyze the content of curriculum of existing entrepreneurship education programs.

Responding to the described gap we analyze this understudied side of entrepreneurship training in higher education institutions, related to formally declared learning outcomes. We focus on leading globally recognized universities, which are of particular importance because they can be seen as benchmarks for other higher education institutions.

1.3. Materials and methods

In the field of entrepreneurial education in universities, there are no clear performance indicators (Nabi et al., 2017). Therefore, in order to select universities, which may be referred to as globally recognized in the field of entrepreneurship education, we used two types of sources. The first source is the relatively recent academic monograph analyzing and describing concrete successful cases of entrepreneurship education in higher education institutions (Volkman & Audretsch, 2017) – 9 universities. The second source is the subject-specific international university ranking on Business and Management studies (QS World University Rankings, Business & Management Studies, 2020) – 34 universities. These universities are frontrunners of global agenda and they may set benchmarks for the whole higher education systems (Sorokin et al., 2022). Working with QS ranking, we selected universities that occupy the highest positions in their countries compared to other universities from the same country. A similar method was used in several studies earlier (Billett, 2011; Sirelkhatim & Gangi, 2015). The present study does not reveal what universities actually teach, focusing rather on the declarative level of skills as learning outcomes, which has its own separate value given the limitations of current research, as we tried to demonstrate above.

We analyzed sections on the official websites dedicated to learning outcomes and descriptions of entrepreneurship education programs and courses on the official English websites of the related universities.

The data was collected in the Spring of 2020. The search for relevant programs and courses was carried out on the universities' official websites. For the automatic search on the website we used the following words: Entrepreneurship, Enterprise; Venture; Start-up; Business; Business Administration; Accounting; Economic; Product; Commerce; Management. In addition, we use the following codes to identify descriptions of master's and bachelor's degree educational products on university websites: undergraduate degree programs; bachelor; master; faculties; academics; programs. We selected and analyzed manually all the detected programs and courses. Only programs and courses, named with words and phrases directly related to entrepreneurship were included in the sample. To analyze skills as expected learning outcomes, content analysis was used regarding the information about the declared learning outcomes on the websites of universities.

The final sample consisted of 61 units of analysis (33 programs and 28 courses) from 43 universities and 24 countries from around the world.

Total number of skills (as declared learning outcomes): 71

Average number of skills (as declared learning outcome) per 1 course (in both master and bachelor level): 4

Average number of skills (as declared learning outcome) per 1 program (in both master and bachelor level): 4 Table 1

Appendix A shows the characteristics of all programs and courses included in the final sample.

2. Results

First, we identify the most frequently mentioned skills as learning outcomes of entrepreneurship programs and courses. The Table 2 below lists the top-5 skills.

Table 2 shows that the most frequently mentioned skills refer to the so called “general human capital” (Kuzminov et al., 2019), including critical thinking, which confirms first of our hypotheses. This may indicate the recognized need for general human capital as learning outcome of entrepreneurship education in universities. At the top is the teamwork/collaboration skill (21 cases). Importantly,

Table 1
Quantitative distribution of observation units (programs and courses) by level of education.

Education level	Program	Course
Master	14	14
Bachelor	19	14

Table 2

Most frequently mentioned skills as learning outcomes of entrepreneurship programs and courses.

Skill	Total number of cases	Number of cases for Bachelor's degree programs and courses	Number of cases for Master's degree programs and courses	Number of cases for educational programs (Bachelor and Master programs)	Number of cases for educational courses (Bachelor and Master courses)
Teamwork/collaboration	21	13	8	13	8
Communication in oral and written form	14	11	3	11	3
Management skill	12	8	4	8	4
Critical thinking	12	8	4	11	1
Decision making/finding solutions to problems/tasks	10	6	4	8	2

this skill appeared ahead of critical thinking, creativity, and other types of thinking skills.

The fact that 29 skills out of 71 are mentioned only once in courses and programs descriptions confirms the fragmentation and lack of consensus on what skills should be taught to future entrepreneurs in higher education institutions across the globe.

We identify 9 different thinking skills (Table 3) including “creativity” among 71 skills. As evident from both the naming of these skills and the context, in which they appear, each of these 9 skills refers to general human capital. This provides another confirmation for the first hypothesis about the importance of thinking skills as a part of general human capital for entrepreneurship education programs and courses in higher education institutions.

Some thinking skills are mentioned only once in our sample (computational thinking, transnational thinking, independent thinking), which highlights the lack of consensus in the international practice about skills as learning outcomes of entrepreneurship education in higher education institutions. However, 3 thinking skills are clearly distinguished as most broadly recognized: creative thinking, analytical thinking, and critical thinking. These types of thinking are the most recognized in the international practice of entrepreneurship education in higher education institutions. Interestingly, creative and critical thinking are also mentioned in other mentioned above studies on entrepreneurial skills/competences (Mitchelmore & Rowley, 2010; Tittel & Terzidis, 2020). However, our findings provide evidence for possible further extension of the list of entrepreneurship skills and competences (including thinking skills), that remain ignored in existing literature.

We also found a thinking skill, which may be regarded as most “entrepreneurial” (“entrepreneurial thinking”). It is mentioned in three cases, but, unfortunately, in each case university website doesn't give a definition concerning what might be implied by “entrepreneurial thinking”. However, the naming of this skill already provides certain confirmation to the second hypothesis of the present study: there are thinking skills, which may be seen as examples of entrepreneurial human capital.

We found little information on the concrete tools that are designed for assessment of the particular learning outcomes. For instance, one of the most well described programs (in Lund university) specifies system of evaluation, which includes assessment of independent thinking. However, this tool appeared not to estimate directly the skill of independent thinking but rather independent thinking (not specified directly) acts as an indicator of high level of general entrepreneurship competence, which combines several elements “theoretical depth, practical relevance, analytical ability and independent thought” (The Entrepreneurial Process & Opportunity Recognition program “Entrepreneurship & Innovation”, 2020)

Moreover, most programs and courses do not give even broad definitions of skills (including thinking skills) as learning outcomes. A possible strategy to fill this gap might be to, first, identify those thinking skills that are already wide-spread in entrepreneurship programs and courses in leading universities across the globe (such list is provided in the present paper), and, second, develop and test tools for measuring the related skills in a joint effort, uniting various universities

To sum up, firstly, thinking skills constitute an important (but not dominant) part of skills as learning outcomes of entrepreneurship training in higher education institutions (9 out of 71 revealed skills refer to thinking skills). Secondly, some thinking skills (computational thinking, transnational thinking, independent thinking) are mentioned only in one case, which indicates inconsistency regarding what types of thinking need to be taught. The lack of consensus also is highlighted by the diversity of all identified skills, and by the fact that programs and courses do not offer definitions of skills. Moreover, they do not describe how they measure skills. Thirdly,

Table 3

Thinking skills in entrepreneurship education in the sample.

Thinking skill	All mentions	Number of programs	Number of courses
Critical thinking	12	11 (33% of all programs)	1 (3% of all courses)
Analytical thinking	9	7 (21% of all programs)	2 (7% of all courses)
Creative thinking	8	7 (21% of all programs)	1 (3% of all courses)
Global thinking	5	5 (15% of all programs)	0 (0% of all courses)
Entrepreneurial thinking	3	3 (9% of all programs)	0 (0% of all courses)
Strategic thinking	2	2 (6% of all programs)	0 (0% of all courses)
Computational thinking	1	1 (3% of all programs)	0 (0% of all courses)
Transnational thinking	1	1 (3% of all programs)	0 (0% of all courses)
Independent thinking	1	1 (3% of all programs)	0 (0% of all courses)

one type of thinking skills may directly refer to the Schultz's idea of the entrepreneurial element of human capital – “entrepreneurial thinking” – however, it is not given a definition and we also did not find the description of the proposed approach to measure it.

2.1. Classification of skills based on human capital theory framework

According to Human Capital theory approach to skills (briefly outlined above), skills are divided into two categories: general and specific ones. However, skills within each of these groups may be too heterogeneous and require additional classification. We used Schultz's idea of the entrepreneurial element of the HC to provide further distinction. Building the classification presented below we oriented on both, the direct naming of the skill and the general context of the curriculum description, in which it is mentioned. Given the lack of clarity in many cases concerning what is implied under certain skills' names, we cannot guarantee that our interpretations are similar to what courses and programs leaders implied. However, the similar approach is broadly implemented in education curriculum studies, mentioned in the previous sections (Mølsted & Karseth, 2016).

“General skills” are divided into two subgroups:

1.1. General skills explicitly not associated with entrepreneurship (for example, teamwork; presentation in written and oral form, etc.) (further this group will be referred to as 1.1.). These skills may be required in a broad circle of jobs, not necessarily connected with business venturing, project management, innovation, etc.

1.2. General skills associated with entrepreneurship (for instance, persuasion, creative thinking, decision-making, etc.) (further this group will be referred to as 1.2.).

The second group of skills are in demand in a wide variety of industries, but according to the recent literature review (Tittel & Terzidis, 2020), they are particularly characteristic of entrepreneurs. As modern labor market surveys show (Stromquist, 2019; Trends, 2017), the skills related to entrepreneurship and innovation are now in demand to some extent in all workplaces, including corporate ones. Therefore, we suggest it is theoretically and practically reasonable that this group of skills should be analyzed separately among other educational outcomes in the field of entrepreneurship education.

2. Specific skills are divided into three subgroups:

2.1. Managerial and expert skills that are related primarily not to entrepreneurial activities, but to a broader areas: economics, management, marketing, finance, etc. (for instance, preparation, interpretation and analysis of accounting information of companies/making financial plan; market analysis, marketing skills, etc.) (this group will be further referred to as 2.1)

2.2. Managerial and expert skills more closely related to entrepreneurial activities, but not limited to entrepreneurship (investor attraction and succession management; innovation management competence; business plan preparation, etc.) (this group will be further referred to as 2.2.)

These groups of skills (2.1 and 2.2) are obviously important for entrepreneurial activity, however, they are not necessarily vital for the entrepreneur himself/herself/themselves. The possession of these specific skills also does not always distinguish an entrepreneur from an innovative/entrepreneurial manager in a company.

2.3. Managerial and expert skills that are most directly linked to entrepreneurship (for instance, managing a team when creating an enterprise; developing projects/ business models and conditions for their development, etc.) (this group will be further referred to as 2.3.)

In contrast to the groups of skills outlined above, these skills relate most directly to the necessary qualities of an entrepreneur himself/herself/themselves. Through the lenses of human capital theory this may be seen as “specific human capital” of an entrepreneur. We define this group of skills based on the Schultz concept of “entrepreneurial element of human capital”, which has not yet been used in the mainstream literature on skills for teaching entrepreneurship.

It must be underlined that among the identified skills, there are those (for instance, in subgroup 1.2.) that are especially ambivalent in their characteristics, that is, they may be referred to different outlined subgroups of skills, depending on the concrete context: program or course description¹. Our assignment of each skill from a program or course to a particular group is connected, firstly, with the most frequent way of the concrete skill' description (on the university websites), and secondly, with the related skill description in academic literature (Tittel & Terzidis, 2020).

The full classification of all detected skills as outcomes of entrepreneurship education into 5 groups can be viewed in the [Appendix B. Table 4](#)

The general skills subgroup 1.2. (18 skills) ranks second in terms of its size. This subgroup mainly consists of skills related to flexibility of thinking, analytical and leadership skills, which are emphasized by academic literature (Borins, 2000; Fayolle et al., 2006; Hartog et al., 2002; Huber et al., 2014; Lauer, 2003; World Bank, 2010). This subgroup is represented more in entrepreneurship

¹ Such ambivalent skills include: decision-making (1.2.), global thinking (1.2), strategic thinking (1.2.), computational thinking (1.2.), persuasion (1.2.), foresight (1.2), transnational thinking (1.2.), achieving personal and team goals using individual and interpersonal skills (1.2), independent thinking (1.2.)

Table 4
Quantitative distribution of skills by 5 groups.

Description of skill subgroups	Number of skills in a subgroup	Number of thinking skills in a subgroup
General skills explicitly associated with entrepreneurship (general skills) 1.2	18	7
General skills explicitly not associated with entrepreneurship (general skills) 1.1	13	3
Managerial and expert skills closely related to entrepreneurial activities, but not limited to entrepreneurship (specific skills) 2.2.	12	0
Managerial and expert skills that are related primarily not to entrepreneurial activities, but to broader areas (specific skills) 2.1	21	0
Managerial and expert skills most explicitly and directly linked to entrepreneurship (specific skills) (2.3)	7	0
All identified skills	71	

education programs (25 programs, 76% of all 33 programs) than in courses (9 courses, 32% of all 28 courses). Still, this indicates a certain consensus in the educational community about the need to develop general human capital (including thinking skills) associated with entrepreneurship in the related initiatives in higher education institutions.

However, not only general human capital is important as learning outcome in entrepreneurship education courses and programs. At least one (and sometimes more than one) skill from the group 2.3. (“managerial and expert skills that are most directly linked to entrepreneurship”) is declared as learning outcome in 5 programs out of 33, which is 15% of all programs, and in 11 courses (out of 28 of all courses), which is 39% of all courses. Importantly, almost every program and course in declared learning outcomes include both general and specific skills.

The concept of “entrepreneurial component” of human capital, formulated by Schultz (1975), so far received little attention in academic literature. In particular, this concept is ignored by growing discussions concerning classification of entrepreneurial skills/competences. Our results suggest that the global education practice in higher education recognizes the importance of skills, directly relating to entrepreneurship behavior, which is evident in the declared formulations of expected learning outcomes. However, greater attention is given to the skills referring to the general human capital (entrepreneurship in a broad sense, including, for instance, corporate entrepreneurship) than to the specific one (entrepreneurship as new venture building). The problem is that clear definitions of the related skills and descriptions of the concrete tools to measure those learning outcomes are lacking in the absolute majority of cases. This situation requires further studies and, first of all, elaboration of the meaningful definition for the entrepreneurial component of the HC and its internal structure, which may include both general and specific skills. The analyzed descriptions of learning outcomes in globally recognized universities suggest that entrepreneurial element of human capital implies being able to act effectively under conditions of uncertainty, in a situation of rapid change. The concrete skills outlined above as general and specific “entrepreneurial human capital” (first of all, groups 1.2 and 2.3) may serve starting points for further empirical analysis, which may have importance also for broader social theory question about the possibility and actual indicators of transformative individual human agency (Kuzminov et al., 2019; Sorokin et al., 2022). The formulations of the expected learning outcomes by leading globally recognized universities for their entrepreneurship education programs and courses provide important information for further discussion, including the possible role of thinking skills.

The three thinking skills that are most broadly represented as expected learning outcomes in our sample – are critical, creative and analytical thinking. This list only partly repeats the thinking skills discussed in academic literature on entrepreneurship, thereby providing evidence for the greater role of thinking skills for entrepreneurship education than is currently suggested.

A full list of ranked 71 identified skills as learning outcomes of higher education entrepreneurship programs and courses (Appendix C) allows to see, which skills prevail. It also demonstrates that there is no general consensus in global higher education practice about the learning outcomes of entrepreneurship education: 17 specific skills and 11 general skills appear only once in our sample consisted of 33 programs and 28 courses directly aimed at entrepreneurship training/education. Importantly, skills as learning outcomes demonstrate little variation depending on the level of education – bachelor’s or master’s, which may indicate that the authors of curricula and courses do not see significant difference in this respect. Indeed, currently there are no global and, in many cases, national standards for entrepreneurship education in universities, distinguishing between the undergraduate and graduate levels, which is an important argument for further institutionalization of entrepreneurship education in higher education and beyond.

3. Conclusions

The aim of the present study was to identify and classify skills as declared learning outcomes among entrepreneurship education programs and courses in higher education by looking at globally recognized universities, indexed in authoritative QS rankings and literature (43 universities).

Our first hypothesis about the important place of thinking skills within declared learning outcomes is partially confirmed. Thinking skills are present in many cases but they are not dominant. We develop the classification of declared learning outcomes of entrepreneurship education in higher education institutions based on the ideas of human capital theory. This classification takes into account the role of thinking skills, which remain on periphery of current discussions about learning outcomes of entrepreneurship education.

The second hypothesis – that there are such formulations of thinking skills as declared learning outcomes that may refer to the T.

Schultz concept about entrepreneurial human capital – is also partly confirmed, since such skill as “entrepreneurial thinking” was found on the websites of universities, declared as the expected learning outcome. At the same time none of the cases when universities mentioned related skills as learning outcomes, provided sufficient details concerning what exactly is meant by these formulations.

Also, we found little consistency in the analyzed universities websites, which confirms our third hypothesis about the high differentiation at the level of the declared learning outcomes.

Our analysis showed that expected outcomes of entrepreneurship education programs and courses tend to combine both general and specific skills, including, in many cases, thinking skills. Of primary importance might be critical, creative and analytical thinking as most widely recognized learning outcomes among thinking skills. This information may be helpful for policy makers and educators launching new projects on entrepreneurship education in universities around the globe. At the same time the problem is how to define and measure those learning outcomes, especially in cases when there is no commonly accepted approach, which is typical for the field of entrepreneurship education in universities.

Our study bases on in-depth qualitative analysis and does not use quantitative inventory. The sample is not sufficiently large to allow valid statistical operations. However, this sample is much larger than samples that all the previous studies on entrepreneurship education in universities have used (to the best of the authors’ knowledge). All the 43 selected universities are indexed in the authoritative international rankings or specific academic literature, which suggests that they may serve as benchmarks for other universities in the related countries.

Our results do not answer what do universities actually teach, since we only looked at official declarations on web-sites. Despite these limitations, our data provides valuable contributions to current discussions. Summing up, it suggests that there is consensus in leading international practice of entrepreneurship teaching in higher education institutions that both specific and general human capital components are important as learning outcomes of entrepreneurship education, with a special place of thinking skills. This study is the first attempt to look at mass international practice of how do universities formulate publicly available expected learning outcomes, what promises do they make to their audiences and various stakeholders. Our results provide a groundwork for future researches.

To finalize, the present study shows that “entrepreneurship education” in higher education institutions as a relatively homogeneous and well-institutionalized global sphere does not yet exist – at least through the perspective of declared learning outcomes. This confirms the importance of further research, including comparative one, concerning the content, expected learning outcomes (including thinking skills), assessment systems, etc. with account of the different national and regional contexts.

Declaration of Competing Interest

The authors declare that there is no conflict of interest.

Acknowledgments

We are thankful to both reviewers.

Appendix A: All programs and courses in the sample

- 1 “The Entrepreneurial Process and Opportunity Recognition” course in “Entrepreneurship and Innovation” program, Lund University <http://kursplaner.lu.se/pdf/kurs/en/ENTN01>
- 2 “Entrepreneurial Marketing” course in “Entrepreneurship and Innovation” program, Lund University <http://kursplaner.lu.se/pdf/kurs/en/ENTN06>
- 3 “Business model development” course in “Entrepreneurship and Innovation” program, Lund University <https://lusem.lu.se/study/masters/programmes/entrepreneurship-innovation/courses>
- 4 “Entrepreneurial leadership” course in “Entrepreneurship and Innovation” program, Lund University <https://lusem.lu.se/study/masters/programmes/entrepreneurship-innovation/courses>
- 5 “Entrepreneurial finance” course in “Entrepreneurship and Innovation” program, Lund University <https://lusem.lu.se/study/masters/programmes/entrepreneurship-innovation/courses>
- 6 “Degree Project – New Venture Creation” course in “Entrepreneurship and Innovation” program, Lund University <http://kursplaner.lu.se/pdf/kurs/en/ENTN19>
- 7 “Innovation Management” in Department of Business Administration, Lund university school of economics and management <http://kursplaner.lu.se/pdf/kurs/en/fekh92>
- 8 “Entrepreneurship” in Department of Business Administration, Lund university school of economics and management <http://kursplaner.lu.se/pdf/kurs/en/FEKH91>
- 9 “Project Management – A Business Perspective” in Department of Business Administration, Lund university school of economics and management <http://kursplaner.lu.se/pdf/kurs/en/FEKH13>
- 10 “Programme in Entrepreneurship and Team Leadership”, Bachelor of Business Administration, Tampere University of Applied Sciences <https://opinto-opas-ops.tamk.fi/index.php/en/167/en/49599/19TIJO/year/2019>
- 11 “Business Model Innovation” course in “Innovation Management and Entrepreneurship” program, Kaunas University of Technology <https://admissions.ktu.edu/program/m-innovation-management-and-entrepreneurship/#S189M121>

- 12 “Innovation Management” course in “Innovation Management and Entrepreneurship” program, Kaunas University of Technology <https://admissions.ktu.edu/program/m-innovation-management-and-entrepreneurship/#S190M109>
- 13 “Entrepreneurship”, University Degree Programme in Business and Economics University of Ljubljana http://www.ef.uni-lj.si/content/static_english/predmet/predmet.asp?l=123&li=2413&predmet_id=195169
- 14 “Entrepreneurial finance”, Design management, innovation and entrepreneurship (master of science degree) management engineering, Milan Polytechnic University https://www4.ceda.polimi.it/manifesti/manifesti/controller/ManifestoPublic.do?EVN_DETtagliO_RIGA_MANIFESTO=evento&aa=2017&k_cf=225&k_corso_la=479&k_indir=DMI&codDescr=097388&lang=EN&semestre=1&idGruppo=3580&idRiga=216506
- 15 “International Business”, Faculty of Economics, University of Valencia <https://www.uv.es/uvweb/college/en/undergraduate-studies/undergraduate-studies-/degree-programmes-offered/degree-international-business-1285846094474/Titulacio.html?id=1285847460674>
- 16 “Business Strategy Faculty of Economics”, University of Valencia <https://www.uv.es/uvweb/college/en/postgraduate-courses/official-master-s-degrees/official-master-s-degrees-offered/master-s-degree-business-strategy-1285848941532/Titulacio.html?id=1285850877606>
- 17 “MSt in Entrepreneurship”, University of Cambridge <https://www.jbs.cam.ac.uk/programmes/mst-entrepreneurship/program-overview/>
- 18 “Product Design BA/BSc (Hons)”, Dublin City University Ryan Academy <https://courses.hud.ac.uk/2020-21/full-time/undergraduate/product-design-ba-bsc-hons>
- 19 “International Business with Entrepreneurship” (Professional Practice) MSc, Dublin City University Ryan Academy <https://courses.hud.ac.uk/2020-21/full-time/postgraduate/international-business-with-entrepreneurship-professional-practice-msc>
- 20 “Business engineering bachelor”, University of Lie`ge <https://www.programmes.uliege.be/cocoon/20192020/en/formations/descr/G1IGES01.html>
- 21 “Intrapreneurship and management of innovation projects”, University of Lie`ge https://www.programmes.uliege.be/cocoon/20192020/programmes/G2UGES01_C.html#3494067
- 22 “Business, Economics, and Management”, California Institute of Technology entrepreneurship <http://www.hss.caltech.edu/academics/undergraduate-studies/social-sciences-options/business-economics-and-management>
- 23 “Science in Management in Entrepreneurial Leadership”, Babson College <https://www.babson.edu/academics/graduate-school/ms-in-entrepreneurial-leadership/>
- 24 “Business Analytics Joint Concentration”, University of Pennsylvania <https://oid.wharton.upenn.edu/programs/undergraduate/business-analytics-joint-concentration/>
- 25 “Engineering Entrepreneurship Courses”, University of Pennsylvania <https://eent.seas.upenn.edu/curriculum/>
- 26 “Entrepreneurship & New Ventures” course in “Program on Entrepreneurship”, Yale University <https://som.yale.edu/faculty-research-centers/centers-initiatives/program-on-entrepreneurship/curriculum>
- 27 “Entrepreneurial Creativity”, University of Michigan-Ann Arbor <http://innovateblue.umich.edu/academics/courses/#core-courses>
- 28 “Entrepreneurial business basics”, University of Michigan-Ann Arbor <https://michiganross.umich.edu/courses/entrepreneurial-business-basics-9848>
- 29 “Social Innovation and Entrepreneurship”, The London School of Economics and Political Science (LSE) <http://www.lse.ac.uk/study-at-lse/Graduate/Degree-programmes-2020/MSc-Social-Innovation-and-Entrepreneurship>
- 30 “Principles of Entrepreneurship”, Northwestern University <https://www.farley.northwestern.edu/programs-and-support/farley-center-courses.html#principles>
- 31 “Engineering Entrepreneurship”, Northwestern University <https://www.farley.northwestern.edu/programs-and-support/farley-center-courses.html#principles>
- 32 “BBA in Global Business” (GBUS), The Hong Kong University of Science and Technology 1 <http://gbus.ust.hk/en/curriculum#12>
- 33 “Master of Entrepreneurship”, The University of Melbourne <https://study.unimelb.edu.au/find/courses/graduate/master-of-entrepreneurship/>
- 34 “Professional skills and ethics”, “Master of Commerce”, The University of New South Wales (UNSW Sydney) <https://www.business.unsw.edu.au/degrees-courses/postgraduate/masters/commerce-mcom#core-courses>
- 35 “Enterprise Systems and Business Design Practicum”, The University of New South Wales (UNSW Sydney) <https://www.business.unsw.edu.au/degrees-courses/postgraduate/masters/commerce-mcom#core-courses>
- 36 “Bachelor of Business”, Nanyang Technological University, Singapore (NTU) 1 <https://nbs.ntu.edu.sg/Programmes/Undergraduate/BachelorofBusiness/Pages/Home.aspx>
- 37 “Bachelor of Business Administration” BBA, The University of Hong Kong <https://www.fbe.hku.hk/ug/programmes/bba>
- 38 “Master of Management Program”, Peking University <http://www.isd.pku.edu.cn/info/1468/2602.htm>
- 39 “Entrepreneurship Management”, “College of Business Administration”, Seoul National University file:///Users/svetlanachernenko/Downloads/Business_Administration.pdf <http://cba.snu.ac.kr/en>
- 40 “Accounting for Business”, “Diploma of Business”, Monash University https://www.monashcollege.edu.au/_data/assets/pdf_file/0010/724861/diploma-business-unit-guide.pdf <https://www.monashcollege.edu.au/courses/diplomas/business>
- 41 “Bachelor of Business Management”, Singapore Management University <https://business.smu.edu.sg/business/programmes/bachelor-business-management/bbm-curriculum>

- 42 “International Business and Chinese Enterprise”, The Chinese University of Hong Kong (CUHK) <http://www.cuhk.edu.hk/prog/ibce/>
- 43 “Global Business”, City University of Hong Kong <https://www.admo.cityu.edu.hk/program/js1001>
- 44 “Bachelor of International Business”, The Australian National University <https://programsandcourses.anu.edu.au/2020/program/BINBS>
- 45 “Bachelor of Business Administration”, The Australian National University <https://programsandcourses.anu.edu.au/2020/program/BBUSA>
- 46 “Master in business analytics and big data – MIBA”, St. Petersburg University <https://gsom.spbu.ru/en/programmes/graduate/miba/>
- 47 “Internet Entrepreneurship”, Higher School of Economics <https://www.hse.ru/en/ma/mc/courses/220766527.html>
- 48 “Business administration, with concentrations in marketing, finance, management of information technology, entrepreneurship and international business”, The American University in Cairo http://catalog.aucegypt.edu/preview_program.php?catoid=29&poid=5109
- 49 “Entrepreneurship”, The American University in Cairo <http://catalog.aucegypt.edu/content.php?catoid=29&navoid=1458#minors>
- 50 “Entrepreneurship and Innovation”, Master of Business Administration, The American University in Cairo http://catalog.aucegypt.edu/preview_program.php?catoid=29&poid=5110
- 51 “International Business” Stellenbosch University [https://www.sun.ac.za/english/faculty/economy/Documents/BCom%20\(Int%20Business\).docx.pdf](https://www.sun.ac.za/english/faculty/economy/Documents/BCom%20(Int%20Business).docx.pdf)
- 52 “Entrepreneurship and New Venture Creation” University of Witwatersrand <https://www.wbs.ac.za/academic-programmes/masters-of-management/mm-in-entrepreneurship-and-new-venture-creation/>
- 53 “Tec21 Business” Monterrey Institute of Technology and Higher Education (B.P.) file:///Users/svetlanachernenko/Downloads/FOLLETO%20A%CC%81REAS-NEGOCIOS.pdf
- 54 “Ingeniería Comercial” Universidad de Chile <https://www.uchile.cl/carreras/4966/ingenieria-comercial>
- 55 “Entrepreneurship and innovation” BI Norwegian Business School <https://www.bi.edu/programmes-and-individual-courses/master-programmes/entrepreneurship-and-innovation/>
- 56 “Technology Based Business Development” course in “Entrepreneurship” program, Norwegian University of Science And Technology <https://www.ntnu.no/studier/emner/TI%3%984170#tab=omEmnet>
- 57 “Master of Innovation management” PSL <https://dauphine.psl.eu/fileadmin/mediatheque/formations/masters/2-plaquettes/management-innovation/plaquette-master-management-innovation-dauphine.pdf>
- 58 “Commercial Manager” University of Montpellier <https://iae.umontpellier.fr/fr/formations/m1-manager-commercial>
- 59 “Business Administration” Universität Mannheim <https://www.uni-mannheim.de/en/academics/programs/bsc-business-administration/#c1274>
- 60 “Graduate School of Management” Kyoto University http://www.gsm.kyoto-u.ac.jp/images/2019/PDF/2019_gsm-brochure_en.pdf
- 61 “Master of Business Administration” Indian Institute of Management (IIM) - Bangalore <https://www.iimb.ac.in/programmes/PGP>

Appendix B: Skills classification as the results of entrepreneurship education into 5 clusters

N ²	General skills (general HC) – skills that are needed regardless of the chosen specialty. Such skills are required in any workplace (for instance, conducting basic business communication, critical thinking, etc.)		Specific skills (specific HC) – skills related to specific jobs (useful not at all jobs, unlike general HC). For the field of entrepreneurship these are skills related to management and expert activities. Such skills are more narrowly focused and are not needed in all specialties. (For instance, managing a team when setting up an enterprise/human resources; writing a reasoned feasibility study, etc.).		
	1.1. The skills that are explicitly not associated with entrepreneurship and innovation (teamwork; presentation in written and oral form, etc.) These skills are characteristic of all jobs, must possess not only the entrepreneur, not only people whose work is connected with business acumen, project management, innovation, etc. (13 skills)	1.2. Skills that are characteristic of many jobs, but are associated with entrepreneurship and/or innovation (persuasion, creative thinking, decision-making, etc.). (18 skills)	2.1. Managerial and expert skills that are not directly related to entrepreneurial and innovative activities, but are related to areas: economics, management, marketing, finance, etc. (preparation, interpretation and analysis of accounting information of companies/ financial plan; market analysis, marketing skills, etc.) (21 skills)	2.2. Managerial and expert skills related to entrepreneurial and/or innovative activities, but not limited in their scope to direct entrepreneurship (investor attraction and succession management; innovation management competence; business plan preparation, etc.) (12 skills)	2.3. Managerial and expert skills that are directly focused on entrepreneurship, innovation (managing a team when creating an enterprise; understanding and developing various projects/forms of business models and conditions for their development, etc.) (7 skills)
1	Presentation (10)	Reproduction/application of knowledge from the field	Mastering business diagnostic tools (7)	Business adaptation to geopolitical conditions	Team management when creating an enterprise

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	The Entrepreneurial Process and Opportunity Recognition, Lund university (M.C.); Degree Project – New Venture Creation, Lund university (M.C.); Entrepreneurship, Lund university (M.C.); Engineering Entrepreneurship Courses, University of Pennsylvania; (B.C.); BBA in Global Business, The Hong Kong University of Science and Technology I; (B.P.) Bachelor of Business, Nanyang Technological University; (B.P.) Business Strategy Faculty of Economics, University of Valencia (M.P.); Innovative economy and technological entrepreneurship; Russian Venture Capital Company;(B.C.) Internet entrepreneurship, Higher School of Economics (M.C.)	of entrepreneurship and management for any field of activity (8) The Entrepreneurial Process and Opportunity Recognition, Lund university (M.C.); Innovation Management, Lund university (M.C.); International Business, University of Valencia (B. P.); Business engineering bachelor, University of Lie'ge; (B.P.); Enterprise Systems and Business Design Practicum, The University of New South Wales; (M.C.) Global Business, City University of Hong Kong; (B.P.) Entrepreneurship, Lund university; Intrapreneurship and management of innovation projects, University of Lie'ge (B.P.)	Intrapreneurship and management of innovation projects, University of Lie'ge; (B.P.); Engineering Entrepreneurship Courses, University of Pennsylvania; (B.C.); Social Innovation and Entrepreneurship, The London School of Economics and Political Science; (M.P.); Business administration, with concentrations in marketing, finance, management of information technology, entrepreneurship and international business, The American University in Cairo; (B.C.); Technology Based Business Development, Norwegian University of Science And Technology;(M.C.) Master Innovation management, PSL;(M.P.) Internet entrepreneurship, Higher School of Economics (M.C.)	(2) International Business, University of Valencia (B. P.); Global Business, City University of Hong Kong (B. P.)	/human resources (4) The Entrepreneurial Process and Opportunity Recognition, Lund university (M.C.); Business Strategy Faculty of Economics, University of Valencia (M.P.); Entrepreneurial business basics, University of Michigan-Ann Arbor; (B. C.); Bachelor of Business Administratio, The University of Hong Kong; (B.P.) Management Graduate School of Business, Moscow State University (M.P.)
2	Teamwork/collaboration/ (21) Entrepreneurial leadership, Lund university (M.C.); Innovation Management, Kaunas University of Technology (M.C.); International Business, University of Valencia (B. P.); Business engineering bachelor, University of Lie'ge (B.P.); Intrapreneurship and management of innovation projects, University of Lie'ge; B.P.); Science in Management in Entrepreneurial Leadership, Babson College (M.P.); Engineering Entrepreneurship Courses, University of Pennsylvania; (B.C.); Entrepreneurship & New Ventures, Yale University (B.C.); Principles of Entrepreneurship, Northwestern University (B.C.); BBA in Global Business, The Hong Kong University of Science and Technology I; (B.P.) Professional skills and ethics, The University of New South Wales; (M.C.)	Assessment and critical analysis of economic phenomena and factors (1) International Business, University of Valencia (B. P.)	Recommendations for improving project management issues/ consulting/expertise (4) Project Management – A Business Perspective, Lund university (M.C.); International Business with Entrepreneurship (Professional Practice) MSc, University of Cambridge (M. P.); Intrapreneurship and management of innovation projects, University of Lie'ge (B.P.); International Business with Entrepreneurship (Professional Practice) MSc, Dublin City University Ryan Academy (M.P.)	Competence in innovation/ high-tech company management (2) Innovation Management, Kaunas University of Technology (M.C.); Engineering Entrepreneurship Courses, University of Pennsylvania (B.C.);	Understanding/ /development of various projects/ forms of business models and conditions for their development (6) Business model development, Lund university (M.C.); Innovation Management, Kaunas University of Technology (M.C.); Entrepreneurship and Innovation, The American University in Cairo;(M.P.) Master Innovation management, PSL;(M.P.) Innovative economy and technological entrepreneurship; Russian Venture Capital Company;(B.C.) Internet entrepreneurship, Higher School of Economics (M.C.)

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	Bachelor of Business, Nanyang Technological University; (B.P.) Bachelor of Business Management, Singapore Management University; (B.P.) Global Business, City University of Hong Kong; (B.P.) program in Entrepreneurship and Team Leadership, Tampere University of Applied Sciences (B.P.); Entrepreneurial Creativity, University of Michigan-Ann Arbor (B.C.); Entrepreneurship and Innovation, The American University in Cairo;(M.P.) Ingeniería Comercial, Universidad de Chile; (B.P.) Entrepreneurship and innovation, BI Norwegian Business School; (M.P.) Business Analytics and Big Data, St. Petersburg State University; (M.P.) Internet entrepreneurship, Higher School of Economics (M.C.)				
3	Planning and time management (8) Degree Project – New Venture Creation, Lund university (M.C.); Project Management – A Business Perspective, Lund university (M.C.); International Business, University of Valencia (B. P.); Principles of Entrepreneurship, Northwestern University; (B.C.); Entrepreneurship, University of Ljubljana (B. C); Business administration, with concentrations in marketing, finance, management of information technology, entrepreneurship and international business, The American University in Cairo; (B.C.); Commercial Manager, University of Montpellier (M.P.) Business Administration, Universität Mannheim (B. P.)	Analysis of (general) political, legal, economic and cultural aspects of the global business environment (presentation of general trends) (1) Global Business, City University of Hong Kong (B. P.)	Market analysis and secondary market data analysis (5) Entrepreneurial business basics, University of Michigan-Ann Arbor; (B.C.); Master of Entrepreneurship, The University of Melbourne; (M.P.) Entrepreneurial Marketing, Lund university (M.C.); Business, Economics, and Management, California Institute of Technology entrepreneurship (B.P.); Internet entrepreneurship, Higher School of Economics (M.C.)	Applying methods to discover, test and evaluate new business opportunities (8) The Entrepreneurial Process and Opportunity Recognition, Lund university (M.C.); Entrepreneurial finance, Lund university (M.C.); Business Model Innovation, Kaunas University of Technology (M.C.); International Business, University of Valencia (B. P.); Global Business, City University of Hong Kong; (B.P.) Innovation Management, Kaunas University of Technology (M.C.); Entrepreneurship, The American University in Cairo (B.C.); Entrepreneurship and innovation, BI Norwegian Business School (M.P.)	Identification, understanding and solution of key problems related to startup management, project management/ technological innovation project (7) Entrepreneurial leadership, Lund university (M.C.); Project Management – A Business Perspective, Lund university; Entrepreneurship, University of Ljubljana (B. C); International Business, University of Valencia (B. P.); Business Strategy Faculty of Economics, University of Valencia (M.P.); Intrapreneurship and management of innovation projects, University of Lie'ge; (B.P.); Entrepreneurial business basics, University of Michigan-Ann Arbor (B.C.)
4	Analytical skill (9) Project Management – A Business Perspective, Lund university (M.C.); Innovation Management, Kaunas University of	Skill of working under pressure/ in a stressful/ conflict situation (3) International Business, University of Valencia (B. P.);	Managerial/Organizational skill (12) program in Entrepreneurship and Team Leadership, Tampere University of	Identification of gaps and obstacles in the innovation activity of the organization (1) Innovation Management,	Mastering research methodologies and procedures in the field of business management) (1) Business Strategy Faculty

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	Technology (M.C.); International Business, University of Valencia (B.P.); Business Analytics Joint Concentration, University of Pennsylvania; (B.P.); Global Business, City University of Hong Kong; (B.P.) Bachelor of Business Administration, The Australian National University;;(B.P.) Entrepreneurship and New Venture Creation; University of Witwatersrand (M.P.) Ingeniería Comercial, Universidad de Chile;(B.P.) Master of Business Administration, Indian Institute of Management (IIM) – Bangalore;(M.P.)	Commercial Manager, University of Montpellier (M.P.) Business Administration, University of Mannheim (B.P.) Graduate School of Management, Kyoto University (M.P.)	Applied Sciences (B.P.); Business Strategy Faculty of Economics, University of Valencia (M.P.); Innovation Management, Kaunas University of Technology (M.C.); Intrapreneurship and management of innovation projects, University of Lie`ge; (B.P.); Social Innovation and Entrepreneurship, The London School of Economics and Political Science; (M.P.); Entrepreneurship Management, Seoul National University;(B.C.) Bachelor of Business Management, Singapore Management University; (B.P.) Bachelor of Business Administration, The Australian National University;(B.P.) Business administration, with concentrations in marketing, finance, management of information technology, entrepreneurship and international business, The American University in Cairo; (B.C.); Entrepreneurship, The American University in Cairo; (B.C.); Tec21 Business, Monterrey Institute of Technology and Higher Education (B.P.) Commercial Manager, University of Montpellier (M.P.)	Kaunas University of Technology (M.C.);	of Economics, University of Valencia (M.P.);
5	Communication in oral and written form (14) Innovation Management, Kaunas University of Technology (M.C.); International Business, University of Valencia (B.P.); Business engineering bachelor, University of Lie`ge; (B.P.); Intrapreneurship and management of innovation projects, University of Lie`ge; (B.P.); Business, Economics, and Management, California Institute of Technology entrepreneurship (B.P.); Science in Management in Entrepreneurial Leadership, Babson College (M.P.); Entrepreneurial Creativity, University of Michigan-Ann Arbor; (B.C.);	Decision making/finding solutions to problems/tasks (10) International Business, University of Valencia (B.P.); Business Analytics Joint Concentration, University of Pennsylvania; (B.P.); Social Innovation and Entrepreneurship, The London School of Economics and Political Science; (M.P.) Engineering Entrepreneurship, Northwestern University; (B.C.); Professional skills and ethics, The University of New South Wales; (M.C.) Bachelor of Business Administration, The University of Hong Kong; (B.P.) Master of Management	Writing a reasoned feasibility study (project) (1) Entrepreneurial Marketing, Lund university (M.C.)	Managing relations between parent companies of multinational corporations and their subsidiaries (1) International Business, University of Valencia (B.P.)	Creating a marketing campaign with entrepreneurial constraints (1) Entrepreneurial Marketing, Lund university (M.C.)

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	BBA in Global Business, The Hong Kong University of Science and Technology I; (B.P.) Bachelor of Business Administration, The University of Hong Kong; (B.P.) Entrepreneurship Management, Seoul National University;;(B.C.) Global Business, City University of Hong Kong; (B.P.) Bachelor of International Business, The Australian National University;;(B.P.) Bachelor of Business Administration, The Australian National University;;(B.P.) Business Analytics and Big Data, St. Petersburg State University; (M.P.)	Program, Peking University; (M.P.); International Business and Chinese Enterprise, The Chinese University of Hong Kong;(B.P.) Ingeniería Comercial, Universidad de Chile;(B.P.) Entrepreneurship and innovation, BI Norwegian Business School; (M.P.)			
6	Working with data/ information (6) International Business, University of Valencia (B. P.); Business Strategy Faculty of Economics, University of Valencia (M.P.); Business Analytics Joint Concentration, University of Pennsylvania (B.P.); Science in Management in Entrepreneurial Leadership, Babson College (M.P.); Business administration, with concentrations in marketing, finance, management of information technology, entrepreneurship and international business, The American University in Cairo; (B.C.); Technology Based Business Development, Norwegian University of Science And Technology;(M.C.)	Generating ideas (5) International Business, University of Valencia (B. P.); Business Strategy Faculty of Economics, University of Valencia (M.P.); Entrepreneurship & New Ventures, Yale University; (B.K.); Principles of Entrepreneurship, Northwestern University; (B.C.); Accounting for Business, Monash University;;(B.C.)	Conducting research (4) Degree Project – New Venture Creation, Lund university (M.C.); Master of Management Program, Peking University (M.P.); Entrepreneurship & New Ventures, Yale University; (B.C.); Entrepreneurship, The American University in Cairo; (B.C.);	Creation and implementation of value innovations in organizations (2) Business Model Innovation, Kaunas University of Technology (M.C.); Master of Entrepreneurship, The University of Melbourne (M.P.)	The skill of acquiring the resources necessary to create a new enterprise, for example, people, financing, strategic partners, etc. (3) Engineering Entrepreneurship Courses, University of Pennsylvania; (B.C.); Master Innovation management, PSL (M.P.) Entrepreneurial finance, Milan Polytechnic University (M.K.);
7	Adaptation (3) Bachelor of Business, Nanyang Technological University; (B.P.) Bachelor of Business Administration, The Australian National University;;(B.P.) Master Innovation management, PSL (M.P.)	Creative thinking (8) Business Strategy Faculty of Economics, University of Valencia (M.P.); Intrapreneurship and management of innovation projects, University of Lie'ge; (B.P.); Entrepreneurial Creativity, University of Michigan-Ann Arbor; (B.C.); Master of Entrepreneurship, The University of Melbourne; (M.P.) Bachelor of Business, Nanyang Technological University; (B.P.) Bachelor of Business Administration, The	Assessment of financial needs of the enterprise, capacity utilization strategies, analysis of venture capital markets (1) Entrepreneurial finance, Lund university (M.C.)	Attracting investors and succession management (1) Entrepreneurial leadership, Lund university (M.C.)	Application (tools) of the principles of engineering entrepreneurship to a real problem in the field of students' knowledge or professional interests (1) Engineering Entrepreneurship Courses, University of Pennsylvania (B.C.);

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		University of Hong Kong; (B.P.) Global Business, City University of Hong Kong; (B.P.) Bachelor of International Business, The Australian National University;(B.P.)		
8	Critical thinking (12) Business Strategy Faculty of Economics, University of Valencia (M.P.); International Business with Entrepreneurship (Professional Practice) MSc, University of Cambridge (M.P.); Business engineering bachelor, University of Lie'ge; (B.P.); Intrapreneurship and management of innovation projects, University of Lie'ge; (B.P.); BBA in Global Business, The Hong Kong University of Science and Technology I; (B.P.) Master of Entrepreneurship, The University of Melbourne; (M.P.) Professional skills and ethics, The University of New South Wales (M.C.); Bachelor of Business Management, Singapore Management University; (B.P.) Global Business, City University of Hong Kong; (B.P.) Bachelor of International Business, The Australian National University;;(B.P.) Bachelor of Business Administration, The Australian National University;;(B.P.) International Business, Stellenbosch University (B. P.)	Leadership Skill (9) Business Strategy Faculty of Economics, University of Valencia (M.P.); Intrapreneurship and management of innovation projects, University of Lie'ge; (B.P.); Science in Management in Entrepreneurial Leadership, Babson College (M.P.); Social Innovation and Entrepreneurship, The London School of Economics and Political Science (M.P.); BBA in Global Business, The Hong Kong University of Science and Technology I; (B.P.) Global Business, City University of Hong Kong; (B.P.) Bachelor of Business Administration, The Australian National University;;(B.P.) Graduate School of Management, Kyoto University; (M.P.) Master of Business Administration, Indian Institute of Management (IIM) – Bangalore; (M.P.)	Cost forecasting/ coordination (2) Business Model Innovation, Kaunas University of Technology (M.C.); International Business, University of Valencia (B. P.);	Ability to perform system analysis and evaluation of innovation interaction cycles (1) Innovation Management, Kaunas University of Technology (M.C.);
9	Listening Skill (1) Product Design BA/BSc (Hons), Dublin City University Ryan Academy (B.P.);	Entrepreneurial thinking (3) International Business with Entrepreneurship (Professional Practice) MSc, University of Cambridge (M.P.); Entrepreneurship and innovation, BI Norwegian Business School; (M.P.) International Business with Entrepreneurship (Professional Practice) MSc, Dublin City University Ryan Academy (M.P.);	Application of methods of rethinking (analysis tools) the boundaries of markets and industries (1) Business Model Innovation, Kaunas University of Technology (M.C.);	Assessment of the viability of the market for new high-tech ideas (2) Engineering Entrepreneurship Courses, University of Pennsylvania (B.C.); Internet entrepreneurship, Higher School of Economics (M.C.)
10	The ability to ask the right questions (2) Social Innovation and Entrepreneurship, The London School of	Global thinking (5) Business engineering bachelor, University of Lie'ge; (B.P.); Intrapreneurship and	Analysis, development and control of commercial functions of companies, financial information /product commercialization	Formation of high-tech ideas into products or services for markets (2) Engineering Entrepreneurship Courses,

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	Economics and Political Science (M.P.); Entrepreneurship and New Venture Creation; University of Witwatersrand (M.P.)	management of innovation projects, University of Lie'ge; (B.P.); BBA in Global Business, The Hong Kong University of Science and Technology I; (B.P.) International Business, Stellenbosch University (B. P.) Graduate School of Management, Kyoto University (M.P.)	(5) International Business, University of Valencia (B. P.); Master of Entrepreneurship, The University of Melbourne; (M.P.) Accounting for Business, Monash University;(B.K.) Entrepreneurship and Innovation, The American University in Cairo (M.P.); Technology Based Business Development, Norwegian University of Science and Technology;(M.C.)	University of Pennsylvania; (B.C.); Entrepreneurial business basics, University of Michigan-Ann Arbor (B.C.);
11	Computational thinking (1) Bachelor of Business Management, Singapore Management University (B. P.)	Showing initiative (2) Intrapreneurship and management of innovation projects, University of Lie'ge; (B.P.); Bachelor of Business Administration, The Australian National University;(B.P.)	Preparation, interpretation and analysis of accounting information of companies/ financial plan (2) International Business, University of Valencia (B. P.); Engineering Entrepreneurship Courses, University of Pennsylvania (B.C.);	Development of a business plan and a program for the organization of innovative activities of a research and production unit (2) Business administration, with concentrations in marketing, finance, management of information technology, entrepreneurship and international business, The American University in Cairo; (B.C.); Entrepreneurship, The American University in Cairo (B.C.)
12	Fluency in oral and written communication in a foreign language (4) International Business, University of Valencia (B. P.); Business Strategy Faculty of Economics, University of Valencia (M.P.); Business engineering bachelor, University of Lie'ge; (B.P.); International Business, Stellenbosch University (B. P.)	Strategic thinking (2) Intrapreneurship and management of innovation projects, University of Lie'ge; (B.P.); Entrepreneurship and New Venture Creation, University of Witwatersrand (M.P.)	Preparation and protection of reports that facilitate decision-making by public and private agents (2) International Business, University of Valencia (B. P.); Accounting for Business, Monash University;;(B.C.)	Ability to apply methods of socioeconomic, organizational-economic, marketing and financial support of innovation and other activities (2) Innovative economy and technological entrepreneurship; Russian Venture Capital Company;(B.C.) Internet entrepreneurship, Higher School of Economics (M.C.)
13	Conducting business correspondence and negotiations (1) Business Analytics and Big Data, St. Petersburg State University; (M.P.)	Business acumen (ability to see business opportunities, etc.) (1) Master of Entrepreneurship, The University of Melbourne (M.P.)	Methods of strategic diagnostics using quantitative and qualitative methods (2) Business Strategy Faculty of Economics, University of Valencia (M.P.); Business, Economics, and Management, California Institute of Technology entrepreneurship (B.P.)	
14		Independent thinking (1) Global Business, City University of Hong Kong (B. P.)	Using accounting, mathematical, statistical and computer tools to solve the management problem (1) Business engineering bachelor, University of Lie'ge (B.P.)	
15		Achieving personal and team goals using individual and interpersonal skills (1) Global Business, City	Application of the basic principles of chemistry and physics through the implementation of a specific	

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	University of Hong Kong (B.P.)	product or service of a technological nature (1) Business engineering bachelor, University of Lie`ge (B.P.)
16	Transnational thinking (1) International Business and Chinese Enterprise, The Chinese University of Hong Kong;(B.P.)	Product development/ product implementation (2) Entrepreneurial business basics, University of Michigan-Ann Arbor; (B.C.); Engineering Entrepreneurship, Northwestern University; (B.C.)
17	Foresight (1) Professional skills and ethics, The University of New South Wales (M.C.)	Ability to identify accounting elements and explain some generally accepted accounting principles and characteristics of financial information (1) Accounting for Business, Monash University;(B.C.)
18	Persuasion Skill (1) Entrepreneurial Creativity, University of Michigan-Ann Arbor (B.C.);	Using double entry rules to record accounting transactions for both the service sector and the trade sector in a general journal and publication book (1) Accounting for Business, Monash University;(B.C.)
19		The skill of recording closing records for temporary accounts (1) Accounting for Business, Monash University;(B.C.)
20		Measuring assets, liabilities, stocks and earnings (1) Business administration, with concentrations in marketing, finance, management of information technology, entrepreneurship and international business, The American University in Cairo (B.C.)
21		Business analysis (1) BBA in Global Business, The Hong Kong University of Science and Technology I (B.P.)

Appendix C: Ranking of all skills

The number of mentions of the skill in programs/courses	Skills
21	Teamwork/collaboration/collaboration
14	Communication in oral and written form
12	Managerial/Organizational skill Critical thinking
10	Presentation in written and oral form Analytical skill
9	Decision-making/finding solutions to problems/tasks Leadership Skill
8	Reproduction/application of knowledge from the field of entrepreneurship and management for any field of activity Planning and time management

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The number of mentions of the skill in programs/courses	Skills
	Applying methods to discover, test and evaluate new business opportunities
7	Creative thinking Identification, understanding and solution of key problems related to startup management, project management/ technological innovation project
6	Mastering business diagnostic tools Understanding and developing various projects/forms of business models and conditions for their development
5	Working with data/information Market analysis and secondary market data analysis Generating ideas Analysis, development and control of commercial functions of companies, financial information /product commercialization
4	Global thinking Recommendations for improving project management issues/consulting/expertise Team management when creating an enterprise /human resources Conducting research
3	Fluency in oral and written communication in a foreign language Skill of working under pressure/ in a stressful/conflict situation The skill of acquiring the resources necessary to create a new enterprise, for example, people, financing, strategic partners, etc. Adaptation
2	Entrepreneurial thinking Competence of innovation management/high-tech companies Business adaptation to geopolitical conditions Creation and implementation of value innovations in organizations Cost forecasting/coordination Assessment of the viability of the market for new high-tech ideas Formation of high-tech ideas into products or services for markets The ability to ask the right questions Development of a business plan and a program for the organization of innovative activities of a research and production unit Preparation, interpretation and analysis of accounting information of companies/financial plan Ability to apply methods of socioeconomic, organizational-economic, marketing and financial support of innovation and other activities Preparation and protection of reports that facilitate decision-making by public and private agents Showing initiative Methods of strategic diagnostics using quantitative and qualitative methods Product development/product implementation
1	Strategic thinking (important in the context of entrepreneurship, according to the literature review) Assessment and critical analysis of economic phenomena and factors Business analysis Mastering research methodologies and procedures in the field of business management Analysis of (general) political, legal, economic and cultural aspects of the global business environment (presentation of general trends) Writing a reasoned feasibility study (project) Creating a marketing campaign with entrepreneurial constraints Identification of gaps and obstacles in the innovation activity of the organization Managing relations between parent companies of multinational corporations and their subsidiaries Assessment of financial needs of the enterprise, capacity utilization strategies, analysis of venture capital markets Attracting investors and succession management Ability to perform system analysis and evaluation of innovation interaction cycles Application (tools) of the principles of engineering entrepreneurship to a real problem in the field of students' knowledge or professional interests (with subsequent creation of a project) Listening Skill Application of methods of rethinking (analysis tools) the boundaries of markets and industries Computational thinking Conducting business correspondence and negotiations Persuasion Skill Measuring assets, liabilities, stocks and earnings Foresight Skill of recording, closing records for temporary accounts Transnational thinking (understanding of relations between countries, understanding of international economic and political processes, may be part of the global) Using double entry rules to record accounting transactions for both the service and trade sectors in a general journal and book publication Achieving personal and team goals using individual and interpersonal skills Ability to identify accounting elements and explain some generally accepted accounting principles and characteristics of financial information Independent thinking Using accounting, mathematical, statistical and computer tools to solve the management problem

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The number of mentions of the skill in programs/courses	Skills
	Business acumen
	Application of the basic principles of chemistry and physics through the implementation of a specific product or service of a technological nature

References

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